

51. The method of claim 45 wherein the photoresist further comprises a thermal acid generator compound.

52. The method of claim 45 wherein the photoresist layer is exposed to patterned radiation having a wavelength of less than 200 nm.

53. The method of claim 45 wherein the photoresist layer is exposed to patterned radiation having a wavelength of 193 nm.

REMARKS

The specification has been amended; claim 31 has been cancelled without prejudice; claims 17 and 37 have been amended; and claims 39-53 have been added. No new matter has been added by virtue of the amendments. For instance, support for the amendment to the specification appears e.g. in original claim 27. Support for the amendments of claims 17 and 37 appears e.g. in original claims 15 and 22. Support for new claims 39-53 appears e.g. at page 4, lines 12-20; page 5, lines 5-11; and the original claims of the application.

As an initial matter, Applicants note that an initialed copy of the 1449-form of Applicants' previously filed Information Disclosure Statement was not included with the present Office Action. A copy of that previously filed Information Disclosure Statement is enclosed. Applicants respectfully request receipt of an initialed 1449 form with the next Office Communication indicating that the cited documents have been considered and made of record. Applicants will provide copies of any of the cited documents upon request.

The specification was objected-to for lack of antecedent basis for claim 27.

Page 6 of the application has been amended to obviate this formal-type objection.

Claim 31 was rejected under 35 U.S.C. 112, first paragraph.

While Applicants fully disagree with the rejection, claim 31 also has been cancelled without prejudice herein. It is thus believed the rejection has been obviated. Withdrawal of the rejection is requested.

Claims 17-27 and 31-38 were rejected under 35 U.S.C. 103 over Watanabe et al. (U.S. Patent 6,022,665) in view of Jeoung et al. (U.S. Patent 6,358,672) with Yamada (U.S. Patent 6,241,857). The rejection is traversed.

Independent claims 17 and 37 as amended herein recite that a photoresist is applied over a microelectronic wafer substrate that comprises one or more contact holes and that the photoresist comprises a thermal acid generator compound.

As discussed at page 4, lines 21-26 of the application, a thermal acid generator can be advantageous and promote crosslinking during post-development thermal treatment.

None of the cited documents in any manner suggest use of such a thermal acid generator.

Additionally, no particular incentive would have existed to employ a resist reported in the Watanabe patent in the system reported in the Jeong patent, or that the resist reported by Watanabe patent would be useful for contact hole applications.

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The cited documents also provide no suggestion of Applicants' new claims 45-53, which recite that the polymer that comprises photoacid-labile groups is substantially free of aromatic groups.

In clear distinction, the Watanabe patent is directed to a resist that contains a phenyl-based polymer.

In view thereof, reconsideration and withdrawal of the rejection is requested.

It is believed the present application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,



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VERSION TO SHOW MARKED CHANGES

IN THE SPECIFICATION

Please amend the third full paragraph of page 6 (currently lines 11-16) to read as follows:

As discussed above, the resists should not significantly crosslink during pre-exposure softbake temperatures (e.g. about 110°C or less, for no more than about 1 minute) or during any post-exposure, pre-development thermal treatment that may be employed to promote the latent image patterned into exposed resist areas. Such post-exposure, pre-development thermal treatment is frequently conducted at about 110°C, 120°C or 125°C for no more than 1 minute. ~~Suitably a photoresist is heated after exposure and prior to development at a temperature of not greater than about 120°C, and pre-development heating does not cause substantial crosslinking of the photoresist layer.~~

IN THE CLAIMS

17. (twice amended) A method for treating a microelectronic wafer substrate ~~that comprises one or more contact holes~~, comprising:

a) applying a layer of a positive-acting photoresist composition on the microelectronic substrate ~~that comprises one or more contact holes~~,

the photoresist composition comprising a photoactive component and a polymer that comprises 1) groups reactive to crosslinking; [and] 2) photoacid-labile groups; and 3) ~~a thermal acid generator compound~~;

b) exposing and developing the photoresist layer on the substrate to yield a developed photoresist image; and

c) thermally treating the developed photoresist layer to induce crosslinking of one or more photoresist components.

37. (amended) A method for treating a microelectronic wafer substrate ~~that comprises one or more contact holes~~, comprising:

- a) applying a layer of a positive-acting, chemically-amplified photoresist composition on the microelectronic substrate ~~that comprises one or more contact holes~~, the photoresist composition comprising a photoactive component and a polymer that comprises 1) groups reactive to crosslinking; 2) alkyl acrylate photoacid-labile groups; [, and] 3) phenolic groups; ~~and 4) a thermal acid generator compound; [and]~~
- b) exposing and developing the photoresist layer on the substrate to yield a developed photoresist image; and
- c) thermally treating the developed photoresist layer to induce crosslinking of one or more photoresist components.